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So You Have High Blood Cholesterol . . .

U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES
Public Health Service
National Institutes of Health

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Know Your Cholesterol Level

Lowering your high blood cholesterol is an important step to reducing your risk of coronary heart disease. Remember to ask your doctor to tell you your total cholesterol, LDL-cholesterol, and HDL-cholesterol levels. Use the charts below to record your progress.

Date	Date
Total Cholesterol	Total Cholesterol
HDL	HDL
LDL	LDL
Date	Date
Total Cholesterol	Total Cholesterol
HDL	HDL
LDL	LDL
Date	Date
Total Cholesterol	Total Cholesterol
HDL	HDL
LDL	LDL

National Cholesterol Education Program
National Heart, Lung, and Blood Institute
National Institutes of Health

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Table of Contents

So You Have High Blood Cholesterol 1

High Blood Cholesterol: What It Means 2

How high does your blood cholesterol level have to be to affect your health? 2

How does high blood cholesterol lead to coronary heart disease? 4

What will lowering your high blood cholesterol level do? 5

What factors influence your blood cholesterol level? 5

Blood Cholesterol and Lipoproteins: What They Are 8

Is there "good" and "bad" cholesterol? 8

How are LDL and HDL levels determined? 9

What do your LDL and HDL levels mean? 9

How To Lower Your High Blood Cholesterol 12

What foods contain fat and cholesterol? 12

What are some practical guidelines for changing your diet? 14

What You Can Expect 15

How soon and how much can you expect your blood cholesterol levels to change? 15

How long do you need to follow this diet? 16

What should your blood cholesterol goal be? 16

How do you check your progress? 16

How often should you have your blood cholesterol levels checked? 16

Can you eat before your test? 18

Other Steps You Can Take 19

Do you need to take special medications along with your diet? 19

What are these medications? 19

Do you need to make other changes to lower your blood cholesterol level? 20

What else can you do to lower your risk for coronary heart disease? 20

Where You Can Go For Help 21

What other health professionals, in addition to your doctor, can give you help? 21

How can you get more materials about high blood cholesterol? 21

Glossary 23

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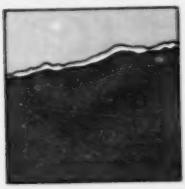
So You Have High Blood Cholesterol . . .



Anyone can develop high blood cholesterol regardless of age, sex, race, or ethnic background. But, because there are no warning symptoms or signs, you are likely to be surprised at such a diagnosis. Don't be alarmed, but do take it seriously. Like high blood pressure, most people are unaware that their blood cholesterol levels are high until they learn it from their doctor. And, like high blood pressure, it is a potential threat to your health that you can do something about.

If you have just learned that you have high blood cholesterol, there are some important facts you need to know to protect your health. First, you need to find out what high blood cholesterol is, how high your level is, and what you can do to lower it. Then prepare to make some changes. Although these changes will depend on many factors considered by your doctor, modifying your diet is the preferred way to lower blood cholesterol.

This brochure will answer many of the questions you may have about your blood cholesterol level. The glossary will help you become familiar with the terms used in this brochure and in other information about cholesterol.

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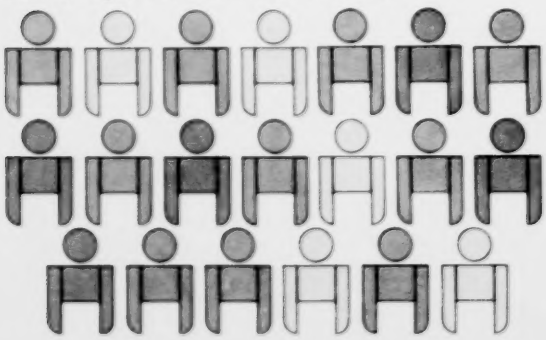
High Blood Cholesterol: What It Means

High blood cholesterol is one of the three **major risk factors** for coronary heart disease (cigarette smoking and high blood pressure are the other two). In other words, high blood cholesterol can significantly increase your risk of developing heart disease. Fortunately all three risk factors are "modifiable"—that is, you can do something about them. You can take steps to lower your cholesterol level and thus lower your risk for coronary heart disease.

High blood cholesterol occurs when there is too much cholesterol in your blood. Your cholesterol level is determined partly by your genetic makeup and the saturated fat and cholesterol in the foods you eat. Even if you didn't eat any cholesterol, your body would manufacture enough for its needs.

How High Does Your Blood Cholesterol Level Have To Be To Affect Your Health?

The risk of developing coronary heart disease increases as your blood cholesterol level rises. This is why it is so important that you have your blood cholesterol level measured. Currently, more than half of all adult Americans have blood cholesterol levels of 200 mg/dl or greater, which places them at an increased risk for coronary heart disease. Approximately 25 percent of the adult population 20 years of age or older has blood cholesterol levels that are considered "high," that is, 240 mg/dl or greater.



Your doctor will measure your level with a blood sample taken from your finger or your arm and will confirm this result with a second test if it is greater than 200 mg/dl. The following table can help you see how the results of your total blood cholesterol tests relate to your risk of developing coronary heart disease.

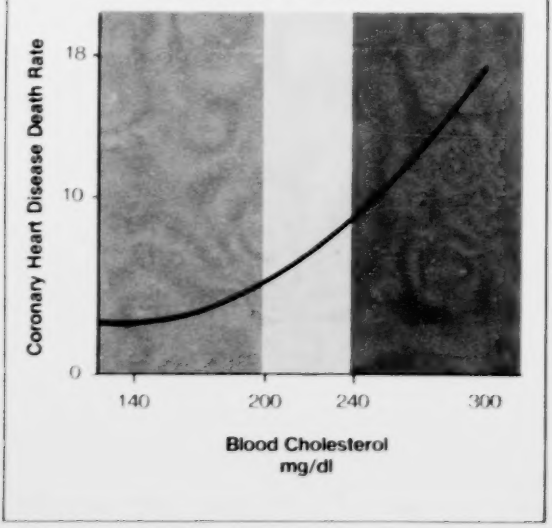
Does Your Total Blood Cholesterol Increase Your Risk For Developing Coronary Heart Disease?

Desirable Blood Cholesterol	Borderline-High Blood Cholesterol	High Blood Cholesterol
Less than 200 mg/dl	200 to 239 mg/dl	240 mg/dl and above

Note: These categories apply to anyone 20 years of age or older.

A blood cholesterol level of 240 mg/dl or greater is considered "high" blood cholesterol. But any level above 200 mg/dl, even in the "borderline-high" category, increases your risk for heart disease. If your blood cholesterol is 240 mg/dl or greater, you have more than twice the risk of someone whose cholesterol is 200 mg/dl, and you need medical attention and further testing.

The Relationship of Blood Cholesterol to Coronary Heart Disease



When your high blood cholesterol level is combined with another major risk factor (either high blood pressure or cigarette smoking), your risk for coronary heart disease increases even further. For example, if your cholesterol

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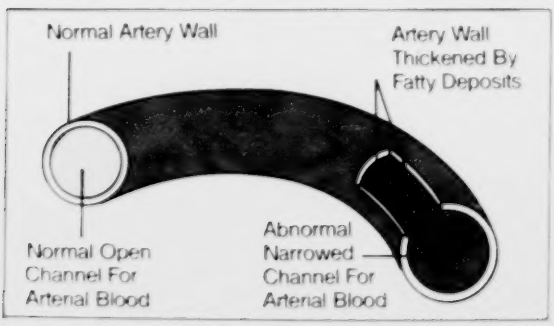
level is in the "high" category and you have high blood pressure, your risk for coronary heart disease increases six times. If you also smoke, your risk increases more than 20-fold. Other factors that increase your risk for coronary heart disease include a family history of coronary heart disease before the age of 55, diabetes, vascular (blood vessel) disease, obesity, and being male. Whether your total blood cholesterol is in the "borderline-high" category or "high" category, you should make some changes in your diet to lower your level. More specifically, if your level is in the "borderline-high" category and you have coronary heart disease or two other risk factors for coronary heart disease or is in the "high" category, your physician will prescribe more aggressive treatment and follow your cholesterol levels more closely. If your cholesterol level is desirable, you should have your level checked again in 5 years and take steps to prevent it from rising.

Risk Factors for Coronary Heart Disease

- High blood cholesterol
- High blood pressure
- Cigarette smoking
- Family history of coronary heart disease before the age of 55
- Diabetes
- Vascular disease
- Obesity
- Being male

How Does High Blood Cholesterol Lead to Coronary Heart Disease?

Most coronary heart disease is caused by atherosclerosis, which occurs when cholesterol, fat, and other substances build up in the walls of the arteries that supply blood to the heart. These deposits narrow the arteries and can slow or block the flow of blood. Among many things, blood carries


Normal Artery Wall
Artery Wall Thickened By Fatty Deposits
Normal Open Channel For Arterial Blood
Abnormal Narrowed Channel For Arterial Blood

a constant supply of oxygen to the heart. Without oxygen, heart muscle weakens, resulting in chest pain (angina), a heart attack (myocardial infarction), or even death. Atherosclerosis is a slow progressive disease that may start very early in life yet might not produce symptoms for many years.

What Will Lowering Your High Blood Cholesterol Level Do?

Lowering your high blood cholesterol level will slow fatty buildup in the walls of the arteries and reduce your risk of a heart attack and death caused by a heart attack. In fact, some studies have shown that, in adults with "high" blood cholesterol levels, for each 1 percent reduction in total cholesterol levels, there is a 2 percent reduction in the number of heart attacks. In other words, if you reduce your cholesterol level 15 percent, your risk of coronary heart disease could drop by 30 percent.

What Factors Influence Your Blood Cholesterol Level?

- **Diet.** Among the factors you can do something about, diet has the largest effect on your blood cholesterol level. Saturated fat raises your blood cholesterol level more than anything else you eat. Dietary cholesterol also increases your blood cholesterol level. If you have high blood cholesterol, changing your diet will be a very important step to lower it.
- **Weight.** Being overweight may also increase your blood cholesterol level. Most overweight patients with high levels of cholesterol can help lower their levels by weight reduction.
- **Physical activity/exercise.** Although it is not clear whether physical activity can prevent atherosclerosis, regular exercise may help you control weight, lower your blood pressure, and increase your level of HDL-cholesterol, the "good" type of blood cholesterol. (HDL-cholesterol is explained in a later section.)
- **Genetic factors.** Genetic factors play a major role in determining your blood cholesterol level and can determine your ability to lower your level by diet. A small number of people have an inherited tendency to have a high blood cholesterol level. If you have a genetic disorder contributing to a high blood cholesterol level, then your parents, children, brothers, and sisters should also have their blood cholesterol levels measured.
- **Sex/age.** Coronary heart disease is the leading cause of death and disability for both men and women in the United States. Estimates are that 1 out of 5 men and 1 out of 17 women will have symptoms of heart disease

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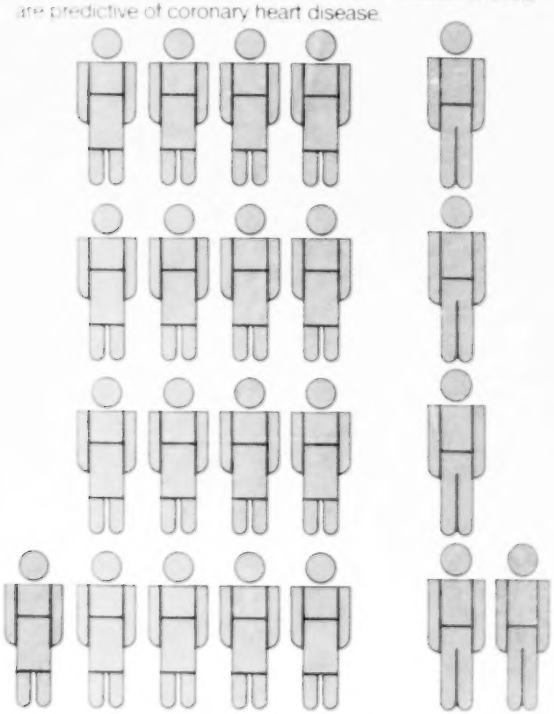
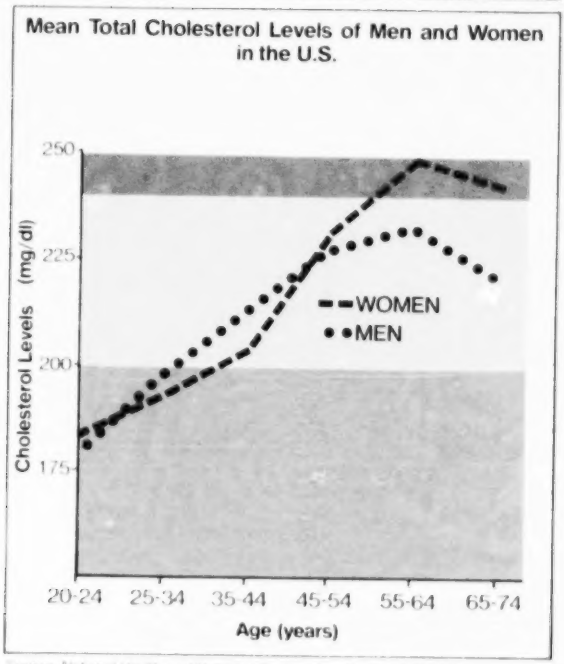
before the age of 60. This means that men have two to three times the risk of developing heart disease as women. However, in women as in men, cholesterol levels are predictive of coronary heart disease.



In the United States, blood cholesterol levels in men and women start to rise at about age 20. Women's blood cholesterol levels prior to menopause (45-60 years) are lower than those of men of the same age. After menopause, however, the cholesterol level of women usually increases to a level higher than that of men. In men, blood cholesterol levels off around age 50 and the average blood cholesterol level declines slightly after age 50. Since the risk of coronary heart disease is especially high in the later decades of life, reducing blood cholesterol levels may be important in the elderly.

In addition, oral contraceptives and pregnancy can increase blood cholesterol levels in some women. For pregnant women, blood cholesterol levels should return to normal 20 weeks after delivery.



Source: National Health and Nutrition Examination Survey (1976-80)

- **Alcohol.** You may have heard that modest amounts of alcohol can improve your cholesterol profile by increasing your HDL-cholesterol level. However, it is not known whether the higher level produced by alcohol protects against coronary heart disease. With this in mind and because drinking can have serious adverse effects, alcohol is not recommended in the prevention of coronary heart disease.

- **Stress.** Although stress has been reported to raise blood cholesterol levels, there may be other explanations for this effect. For example, during periods of stress, people may eat more foods that are high in saturated fat and cholesterol, which may increase their blood cholesterol levels — rather than the stress itself.

While all of these factors can influence your blood cholesterol level, clearly you can do something about a number of them. In fact, most people are able to lower their blood cholesterol levels with diet alone.

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Blood Cholesterol and Lipoproteins: What They Are

Cholesterol is an odorless, soft, waxy substance. Your body needs cholesterol to function normally (for example as a component of cell membranes and for the production of many hormones, vitamin D, and bile acids- which are important for the absorption of fat). Cholesterol is present in all parts of the body, including the brain and nervous system, muscle, skin, liver, intestines, heart, skeleton, etc.

The cholesterol level of your blood is affected by:

- **The cholesterol your body produces and**
- **The saturated fat and cholesterol in your diet.**

Your blood cholesterol level is affected not only by the saturated fat and cholesterol in your diet, but also by the cholesterol your body produces. As a matter of fact, your body produces all the cholesterol it needs, and the saturated fat and cholesterol in your diet only serve to increase your blood cholesterol level.

"Bad" Cholesterol and "Good" Cholesterol

Cholesterol travels in the blood in packages called lipoproteins. All lipoproteins are formed in the liver and carry cholesterol through the body.

Blood cholesterol packaged in low density lipoproteins (LDLs) is transported from the liver to other parts of the body where it can be used. LDLs carry most of the cholesterol in the blood, and if not removed from the blood, cholesterol and fat can build up in the arteries contributing to atherosclerosis. This is why LDL-cholesterol is often called "bad cholesterol."

Cholesterol is also packaged in high density lipoproteins (HDLs). HDLs carry cholesterol back to the liver for processing or removal from the body. HDLs therefore help remove cholesterol from the blood, preventing the accumulation of cholesterol in the walls of the arteries. Thus they are often referred to as "good cholesterol."

How are LDL and HDL Levels Determined?

If your total cholesterol level is either in the "high" category or in the "borderline-high" category and you have coronary heart disease or two other risk factors for coronary heart disease, your doctor will want a more complete "cholesterol profile" that includes LDL-cholesterol, HDL-cholesterol levels, and triglyceride levels. A blood test provides this information: you will have to fast for 12 hours prior to the test. (You may notice that your LDL- and HDL-cholesterol values do not add up to your total blood cholesterol level. LDLs usually carry about 60-70 percent and HDLs about 25 percent of the total cholesterol in your blood. Other lipoproteins carry the rest.)

Some laboratories may calculate your cholesterol ratio. This measurement is actually just your total cholesterol or LDL-cholesterol divided by your HDL-cholesterol. For example, if your LDL-cholesterol level is 140 mg/dl and your HDL-cholesterol level is 35 mg/dl, your cholesterol ratio is 140/35, or 4. However, HDL-, LDL-, and total cholesterol levels are independent predictors of your risk for coronary heart disease. Because combining these values into a ratio can conceal information useful to you and your physician, it is more important to know each value separately.

What Do Your LDL and HDL Levels Mean?

Along with your total blood cholesterol level, your LDL and HDL levels provide more information on your risk of developing coronary heart disease. A high LDL-cholesterol level or a low HDL-cholesterol level puts you at increased risk. LDL- and HDL-cholesterol levels more accurately predict your risk for coronary heart disease than a total cholesterol level alone.

If your doctor measured your LDL-cholesterol level, use the chart below to see how your LDL-cholesterol level measures up.

Does Your LDL-Cholesterol Level Increase Your Risk for Coronary Heart Disease?

Desirable	Borderline-High Risk	High Risk
Less than 130 mg/dl	130 to 159 mg/dl	160 mg/dl and above

If your LDL-cholesterol level is in the "desirable" category, you are at an acceptable level of risk. If your LDL level is in the "borderline-high risk" category, you could benefit from lowering your blood cholesterol level by making some dietary changes. If your LDL level is in the

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Your Physician will Measure Your Lipoproteins And Individualize Your Treatment Based on Your LDL-Cholesterol and Other Risk Factors.
Start a Cholesterol Lowering Diet
Retest in 1 Year
STOP
Yes, Continue
If You Also Have: Coronary Heart Disease or Two Other Major Risk Factors
High (240 mg/dl or Greater) Straight Ahead
Desirable (Less than 200 mg/dl) Exit Here
START
Get Your Blood Cholesterol Level Checked
Proceed to the Correct Exit

"borderline-high risk" category **and** you have coronary heart disease or two risk factors for coronary heart disease, you should begin diet treatment under your physician's supervision, as should a person in the "high risk" category. In general, this means you will be paying closer attention to your cholesterol level and making more dietary changes than a person at lower risk.

HDL-cholesterol will also be measured if your total blood cholesterol puts you in a high risk category. The **lower** your HDL-cholesterol level, the greater your risk for coronary heart disease. *Any HDL-cholesterol level lower than 35 mg/dl is considered too low.* Quitting smoking, losing weight, and becoming physically active may help raise your HDL-cholesterol level. Although it is not known for certain that raising HDL levels in this way will reduce the risk of coronary heart disease, these measures are likely to be good for your heart in any case.

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How To Lower Your High Blood Cholesterol

The primary treatment for high blood cholesterol is a diet that is low in saturated fat and low in cholesterol. This new way of eating is also nutritious, with all the protein, carbohydrate, fat, vitamins, and minerals your body needs. To lower your blood cholesterol, you will:

- Eat less high-fat food (especially those high in saturated fat).
- Replace part of the saturated fat in your diet with unsaturated fat.
- Eat less high-cholesterol food.
- Choose foods high in complex carbohydrates (starch and fiber), and
- Reduce your weight, if you are overweight.

Saturated fats raise your cholesterol level more than anything else in your diet. Dietary cholesterol also raises blood cholesterol levels. Instead of eating foods rich in saturated fat and cholesterol, try more breads, cereals, and other foods high in complex carbohydrates as well as more fruits and vegetables. Using unsaturated fats in place of saturated fats can also help lower your blood cholesterol.

Fortunately, these dietary changes work together. For example, eating less saturated fat may also help you decrease the amount of cholesterol you eat and may help you lose weight. This is because foods high in saturated fat are often high in cholesterol as well and are high in calories. In fact, all fats have more than twice as many calories as either carbohydrate or protein. And, by losing weight if you are overweight, you can help lower your LDL-cholesterol level and increase your HDL-cholesterol level.

Saturated fats are found primarily in animal products, particularly fatty meats and many dairy products.

Coconut oil, palm kernel oil, and palm oil are also very saturated.

Some of the unsaturated fats in vegetable oils are also made **more** saturated by a process called hydrogenation.

Commercially prepared and processed foods made with these vegetable oils or with saturated fats like butter and lard can also be high in saturated fat.

There are two kinds of unsaturated fat: polyunsaturated and monounsaturated. You should substitute both of these for saturated fat in your diet. **Polyunsaturated fats** are found primarily in plant products–including safflower, sunflower, corn, soybean, and cottonseed oils; nuts; and seeds–and in fatty fish. Major vegetable oil sources of **monounsaturated fats** are primarily olive oil and canola oil.

Cholesterol is found only in foods of animal origin, both high-fat foods (like hotdogs and cheddar cheese) and low-fat foods (like liver and other organ meats). And the amount of cholesterol in these foods varies. A daily intake of less than 300 mg is recommended. A 3-ounce piece of meat, fish, or poultry has 60-90 mg of cholesterol; one egg yolk contains about 270 mg; and a 3-ounce serving of liver has about 390 mg of cholesterol.

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What Are Some Practical Guidelines for Changing Your Diet?

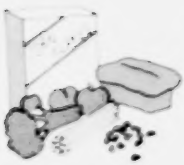
Again, to reduce your blood cholesterol level, your diet should be low in fat, particularly saturated fat, and low in cholesterol. Use the following guidelines as you plan your new diet.

1 To cut back on saturated fats:

- Choose poultry, fish, and lean cuts of meat more often; remove the skin from chicken and trim the fat from meat.
- Drink skim milk or 1% milk instead of 2% milk or whole milk. And eat cheeses with no more than 2-6 grams of fat per ounce (like low-fat cottage or low-fat farmer cheese) instead of processed, natural, and hard cheeses (like American, brie, and cheddar).
- Use tub margarines or liquid vegetable oils that are high in unsaturated fat (like safflower, corn, and olive oil) instead of butter, lard, and hydrogenated vegetable shortening that are high in saturated fat. Choose products that list more unsaturated fat than saturated fat on the label.
- Cut down on commercially prepared and processed foods made with saturated fats or oils. Read labels to choose those low in saturated fats.

2 To cut back on dietary cholesterol:

- Eat less organ meat such as liver, brain, and kidney.
- Eat fewer egg yolks; try substituting two egg whites for each whole egg in recipes.



3 To increase complex carbohydrates (starch and fiber):

- Eat more whole grain breads and cereals, pasta, rice, and dried peas and beans.
- Eat vegetables and fruits more often.

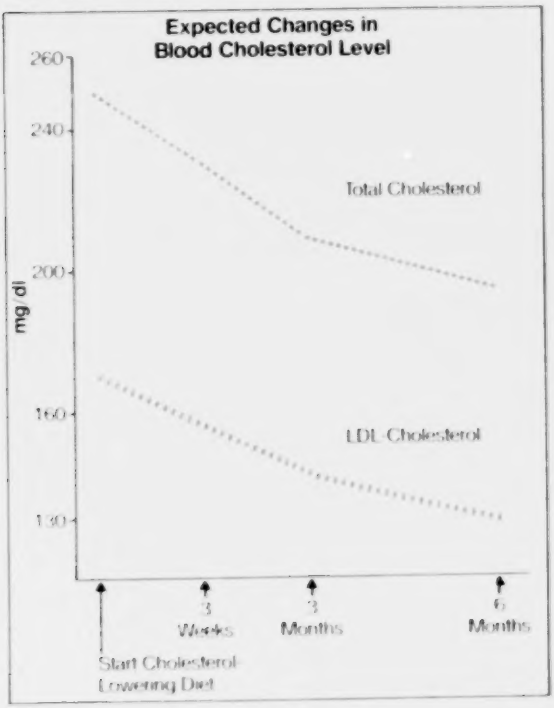
4 To lose weight:

- Eat fewer daily calories (cutting back on fat in your diet will really help).
- Burn extra calories by exercising regularly.

What You Can Expect

Remember, by closely following your diet and monitoring your progress with regular checkups, you can lower your blood cholesterol level and greatly reduce your risk of developing coronary heart disease.

Generally, both your total and LDL-cholesterol levels will begin to drop 2-3 weeks after you begin your cholesterol-lowering diet. Over time, you may reduce your cholesterol levels by 30-55 mg/dl or even more. The more you reduce your level, the more you will reduce your risk of developing coronary heart disease.



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How much you reduce your blood cholesterol levels depends on how much fat, specifically saturated fat, and how much cholesterol you were eating before starting your cholesterol-lowering diet; how well you follow your new diet; and how responsive your body is to the diet. Also, the higher your blood cholesterol level is to begin with, the greater or more dramatic reduction you can expect with your new diet.

How Long Do You Need to Follow This Diet?

Your new cholesterol-lowering diet should be continued for life. While eating some foods high in saturated fat and cholesterol for 1 day or at one meal will not raise blood cholesterol levels, resuming old eating patterns will. Surprisingly, after a while your new way of eating won't seem like a "diet" at all, but simply like your regular routine - full of appealing and appetizing foods.

What Should Your Blood Cholesterol Goal Be?

Before starting your cholesterol-lowering diet, your physician will determine your blood cholesterol goal, specifically the LDL-cholesterol level, that is right for you. This goal will vary depending on whether you have coronary heart disease or any of the other risk factors for coronary heart disease. Even though achieving your LDL-cholesterol goal is more important that the total cholesterol goal, your physician can check your progress by measuring your total cholesterol level because it is a good deal simpler and because you do not have to fast before its measurement. Remember, a total cholesterol level below 200 mg/dl and an LDL-cholesterol below 130 mg/dl are desirable.

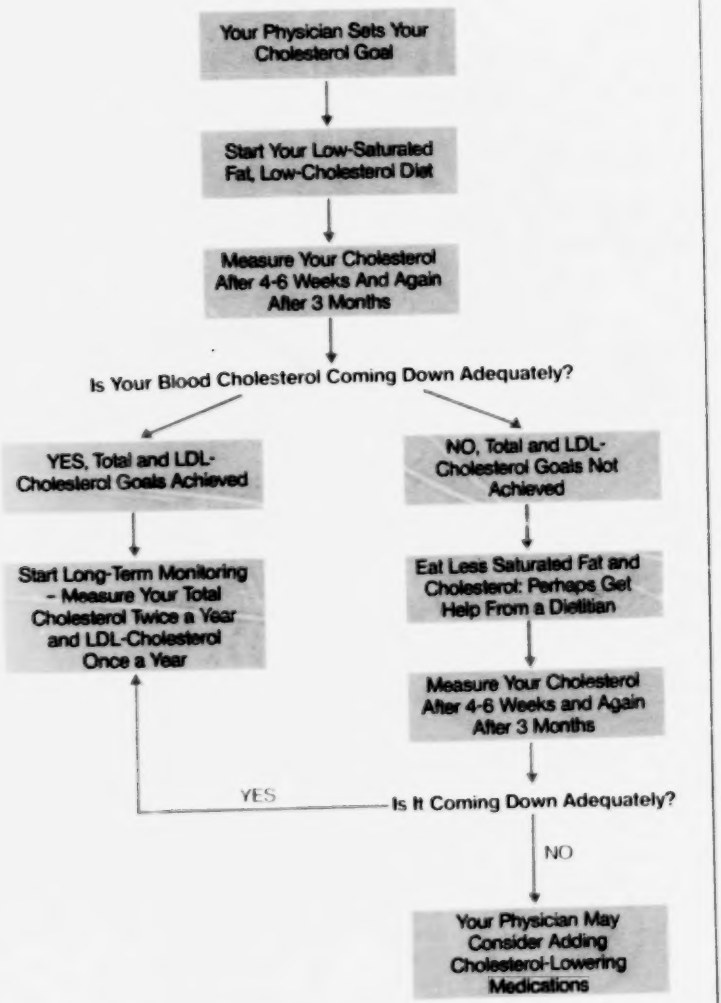
How Do You Check Your Progress?

To get your blood cholesterol measured, see your doctor or local clinic. They will take a blood sample and send it to a laboratory. There may be differences in your blood cholesterol level from day to day. Cholesterol measurements may also differ somewhat from one laboratory to the next. Your doctor will consider these factors when you return to check your progress. It is important that you have your cholesterol level measured at the same place each time.

How Often Should You Have Your Blood Cholesterol Levels Checked?

Your physician will probably want to measure your cholesterol level after you have been on the diet for 4-6 weeks and again after 3 months. If the total cholesterol goal is met after 3 months, measuring your LDL-cholesterol level will confirm that the LDL-cholesterol goal has been met. If your response to the diet has been satisfactory (both total cholesterol and LDL-cholesterol goals have been met), you

Measuring Your Progress: A Sensible Plan


Your Physician Sets Your Cholesterol Goal
Start Your Low-Saturated Fat, Low-Cholesterol Diet
Measure Your Cholesterol After 4-6 Weeks And Again After 3 Months
Is Your Blood Cholesterol Coming Down Adequately?
YES, Total and LDL-Cholesterol Goals Achieved
NO, Total and LDL-Cholesterol Goals Not Achieved
Start Long-Term Monitoring – Measure Your Total Cholesterol Twice a Year and LDL-Cholesterol Once a Year
Eat Less Saturated Fat and Cholesterol: Perhaps Get Help From a Dietitian
Measure Your Cholesterol After 4-6 Weeks and Again After 3 Months
YES
Is It Coming Down Adequately?
NO
Your Physician May Consider Adding Cholesterol-Lowering Medications

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will enter a phase of long-term monitoring. Long-term monitoring may involve remeasuring total cholesterol twice a year and LDL-cholesterol once a year.

If you have not met your blood cholesterol goal in 3 months, your doctor may further restrict the saturated fat and cholesterol in your diet and enlist the help of a dietitian. Then, after 4-6 weeks more and again after 3 months, your doctor may measure your cholesterol level. If you have attained your goal, long-term monitoring can begin. If not, your doctor may decide you need medication along with your dietary changes.

Can You Eat Before Your Test?

Since total cholesterol levels do not change much after a meal, total cholesterol can be measured at any time of day, whether or not you have just eaten. Therefore, you do not need to fast. However, you should not eat or drink anything except water or black coffee for at least 12 hours before having your lipoprotein levels determined (LDL, HDL, triglycerides). Therefore, it may be convenient to eat your last meal at about 9 p.m. and have your test the next day before breakfast.

Other Steps You Can Take

While dietary change is the first and most important action you will be taking to lower your blood cholesterol level, your doctor may suggest other steps you can take. These will depend on how well the diet lowers your blood cholesterol level and whether or not you have any other risk factors for coronary heart disease.

Do You Need to Take Special Medications Along With Your Diet?

In most cases, a blood cholesterol-lowering diet is the only step necessary to lower blood cholesterol levels. However, if your LDL-cholesterol level is still too high after you've been on your diet for 6 months, your doctor may decide to include medication as part of your treatment. In addition, if your cholesterol level is unusually high or if you have other major risk factors for coronary heart disease, your doctor may prescribe medications to lower blood cholesterol even sooner.

If your doctor does prescribe medications, you must continue your cholesterol-lowering diet since the combination may allow you to take less medication to lower your levels. And, because diet is still the safest treatment, you should always try to lower your levels with diet alone before adding medication.

What Are These Medications?

There are several medications your physician can prescribe to help you lower your blood cholesterol levels. The report issued by the National Cholesterol Education Program cited the bile acid sequestrants—cholestyramine and colestipol—and nicotinic acid as the drugs of first choice. The report underscored the effectiveness *and* the long-term safety of these drugs as demonstrated in research studies. The report also cited a new class of drug—HMG CoA reductase—which has demonstrated considerable effectiveness in lowering cholesterol levels. One drug in this class—lovastatin—has been approved for use by the Food and Drug Administration. Because of its newness, long-term safety data has not yet been established. Other drugs cited in the report which were not considered as efficacious in lowering LDL-cholesterol as those mentioned above include gemfibrozil and probucol. All cholesterol-lowering medications should be taken only with the advice of and under the supervision of your physician.

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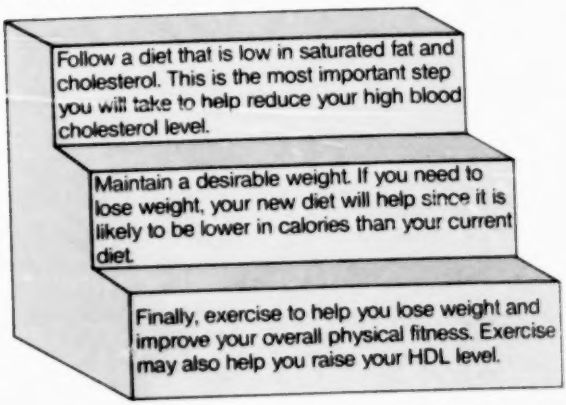
Do You Need to Make Other Changes to Lower Your Blood Cholesterol Level?

The key changes you need to make are the ones discussed above. To review:


Follow a diet that is low in saturated fat and cholesterol. This is the most important step you will take to help reduce your high blood cholesterol level.
Maintain a desirable weight. If you need to lose weight, your new diet will help since it is likely to be lower in calories than your current diet.
Finally, exercise to help you lose weight and improve your overall physical fitness. Exercise may also help you raise your HDL level.

Unless your doctor prescribes a cholesterol-lowering medication, these are the only steps you will need to take to lower your blood cholesterol level.

What Else Can You Do to Lower Your Risk for Coronary Heart Disease?

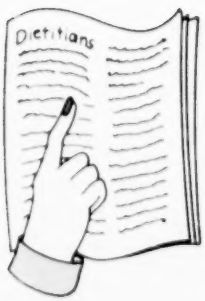
Fortunately, you can do something about all three of the major risk factors for coronary heart disease – high blood cholesterol, cigarette smoking, and high blood pressure. Thus, in addition to lowering your blood cholesterol level, it's a good idea to quit smoking and control your blood pressure. Maintaining your desirable weight will also help you lower your risk for coronary heart disease. And all of these steps will help you to feel better.

Where You Can Go for Help

Need more help? Want to know more? There are many places you can go to get information about your new diet, your diagnosis, and the latest findings about treatment and medications for high blood cholesterol.

What Other Health Professionals, in Addition to Your Doctor, Can Give You Help?

If you want some help following your recommended diet, talk to a registered dietitian or qualified nutritionist. They can explain the diet to you in greater detail and show you ways to follow it. They can give you advice on shopping and preparing foods, eating away from home, and changing your eating habits to help you stay on your new diet. They will also help you set goals for dietary change so that you can successfully lower your high blood cholesterol levels without drastically changing your eating pattern and overall lifestyle all at one time. The Division of Practice of the American Dietetic Association [(312) 899-0040] can help you find a registered dietitian in your area. State and local branches of the American Dietetic Association, your local hospital, or your doctor can recommend a dietitian for you.



There are also other resources. The nurse in your doctor's office can answer questions you may have about your high blood cholesterol or your new diet. If your blood cholesterol level is not lowered by your doctor may refer you to a physician who is a lipid specialist. Lipid specialists are experts in the management of high blood cholesterol and other lipid disorders. If you have questions about drug therapy or the medication your doctor is prescribing, ask your doctor. Finally, pharmacists are also aware of the best ways to take medication, of ways to minimize side effects, and of the latest research about specific drugs.

How Can You Get More Materials About High Blood Cholesterol?

If you would like more information to help you start your new approach to healthy eating, contact the National Cholesterol Education Program (NCEP) of the National Heart, Lung, and Blood Institute. Another NCEP pamphlet that can help you, *Eating to Lower Your High Blood Cholesterol*, provides more specific information on how to lower your blood cholesterol levels through diet. NCEP also has developed a resource list of agencies and organizations that can answer your questions. These and other materials can be requested by writing:

National Cholesterol Education Program
National Heart, Lung, and Blood Institute
C-200
Bethesda, MD 20892

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Glossary

1. **Atherosclerosis**--A type of "hardening of the arteries" in which cholesterol, fat, and other blood components build up in the walls of arteries. As atherosclerosis progresses, the arteries to the heart may narrow so that oxygen-rich blood and nutrients have difficulty reaching the heart.

2. **Bile acid sequestrants**--One type of cholesterol-lowering medication, including cholestyramine and colestipol. The sequestrants bind with cholesterol-containing bile acids in the intestine and remove them in bowel movements.

3. **Carbohydrate**--One of the three nutrients that supply calories (energy) to the body. Carbohydrate provides 4 calories per gram--the same number of calories as pure protein and less than half the calories of fat. Carbohydrate is essential for normal body function. There are two basic kinds of carbohydrate--simple carbohydrate (or sugars) and complex carbohydrate (starches and fiber). In nature, both the simple sugars and the complex starches come packaged in foods like oranges, apples, corn, wheat, and milk. Refined or processed carbohydrates are found in cookies, cakes, and pies.

   - **Complex carbohydrate**--Starch and fiber. Complex carbohydrate comes from plants. When complex carbohydrate is substituted for saturated fat, the saturated fat reduction lowers blood cholesterol. Foods high in starch include breads, cereals, pasta, rice, dried beans and peas, corn, and lima beans.

   - **Fiber**--A nondigestible type of complex carbohydrate. High-fiber foods are usually low in calories. Foods high in fiber include whole grain breads and cereals, whole fruits, and dried beans. The type of fiber found in foods such as oat and barley bran, some fruits like apples and oranges, and some dried beans may help reduce blood cholesterol.

4. **Cholesterol**--A soft, waxy substance. It is made in sufficient quantity by the body for normal body function, including the manufacture of hormones, bile acid, and vitamin D. It is present in all parts of the body, including the nervous system, muscle, skin, liver, intestines, heart, etc.

   - **Blood cholesterol**--Cholesterol that is manufactured in the liver and absorbed from the food you eat and is carried in the blood for use by all parts of the body. A high level of blood cholesterol leads to atherosclerosis and coronary heart disease.

   - **Dietary cholesterol**--Cholesterol that is in the food you eat. It is present only in foods of animal origin, not in foods of plant origin. Dietary cholesterol, like dietary saturated fat, tends to raise blood cholesterol, which increases the risk for heart disease.

5. **Coronary heart disease**--Heart ailment caused by narrowing of the coronary arteries (arteries that supply oxygen and nutrients directly to the heart muscle). Coronary heart disease is caused by atherosclerosis, which decreases the blood supply to the heart muscle. The inadequate supply of oxygen-rich blood and nutrients damages the heart muscle and can lead to chest pain, heart attack, and death.

6. **Fat**--One of the three nutrients that supply calories to the body. Fat provides 9 calories per gram, more than twice the number provided by carbohydrate or protein. In addition to providing calories, fat helps in the absorption of certain vitamins. Small amounts of fat are necessary for normal body function.

   - **Total fat**--The sum of the saturated, monounsaturated, and polyunsaturated fats present in food. A mixture of all three in varying amounts is found in most foods.

   - **Saturated fat**--A type of fat found in greatest amounts in foods from animals such as meat, poultry, and whole-milk dairy products like cream, milk, ice cream, and cheese. Other examples of saturated fat include butter, the marbling and fat along the edges of meat, and lard and the saturated fat content is high in some vegetable oils--like coconut, palm kernel, and palm oils. Saturated fat raises blood cholesterol more than anything else in the diet.

- **Unsaturated fat**--A type of fat that is usually liquid at refrigerator temperature. Monounsaturated fat and polyunsaturated fat are two kinds of unsaturated fat.

  Monounsaturated fat--A slightly unsaturated fat that is found in greatest amounts in foods from plants, including olive and canola (rapeseed) oil. When substituted for saturated fat, monounsaturated fat helps reduce blood cholesterol.

  Polyunsaturated fat--An highly unsaturated fat that is found in greatest amounts in foods from plants, including safflower, sunflower, corn, and soybean oils. When substituted for saturated fat, polyunsaturated fat helps reduce blood cholesterol.

7. **Gram (g)**--A unit of weight. There are about 28 g in 1 ounce. Dietary fat, protein, and carbohydrate are measured in grams.

8. **Hydrogenation**--A chemical process that changes liquid vegetable oils (unsaturated fat) into a more solid saturated fat. This process improves the shelf life of the product--but also increases the saturated fat content. Many commercial food products contain hydrogenated vegetable oil. Selection should be made based on information found on the label.

9. **Lipids**--Fatty substances, including cholesterol and triglycerides, that are present in blood and body tissues.

10. **Lipoproteins**--Protein-coated packages that carry fat and cholesterol through the blood. Lipoproteins are classified according to their density.

    - **High density lipoproteins (HDL)**--Lipoproteins that contain a small amount of cholesterol and carry cholesterol away from body cells and tissues to the liver for excretion from the body. Low levels of HDL are associated with an increased risk of coronary heart disease. Therefore the higher the HDL level, the better.

    - **Low density lipoproteins (LDL)**--Lipoproteins that contain the largest amount of cholesterol in the blood. LDL is responsible for depositing cholesterol in the artery walls. High levels of LDL are associated with an increased risk of coronary heart disease and are therefore referred to as "bad cholesterol."

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Milligram (mg)--A unit of weight equal to one thousandth of a gram. There are about 28,350 mg in 1 ounce. Dietary cholesterol is measured in milligrams.

Milligrams/deciliter (mg/dl)--A way of expressing concentration; in blood cholesterol measurements, the weight of cholesterol (in milligrams) in a deciliter of blood. A deciliter is about one-tenth of a quart.

Niacin--A B vitamin essential for energy production in cells. The recommended daily allowance is about 14 mg for adult females and about 18 mg for adult males. When used in massive quantities under a physician's guidance, niacin is considered a cholesterol-lowering medication.

Protein--One of the three nutrients that supply calories to the body. Protein provides 4 calories per gram, which is less than half the calories of fat. Protein is an essential nutrient that becomes a component of many parts of the body, including muscle, bone, skin, and blood.

Risk factor--A habit, trait, or condition in a person that is associated with an increased chance (or risk) of developing a disease.

Triglycerides--Lipids (fat-like substances) carried through the bloodstream to the tissues. The bulk of the body's fat tissue is in the form of triglycerides, stored for later use as energy. We get triglycerides primarily from the fat in our diet.

Vascular disease--An ailment of the blood vessels often caused by atherosclerosis. Vascular disease may occur in the arteries to the brain and the major leg arteries.

Limited quantities of this brochure are available free of charge.

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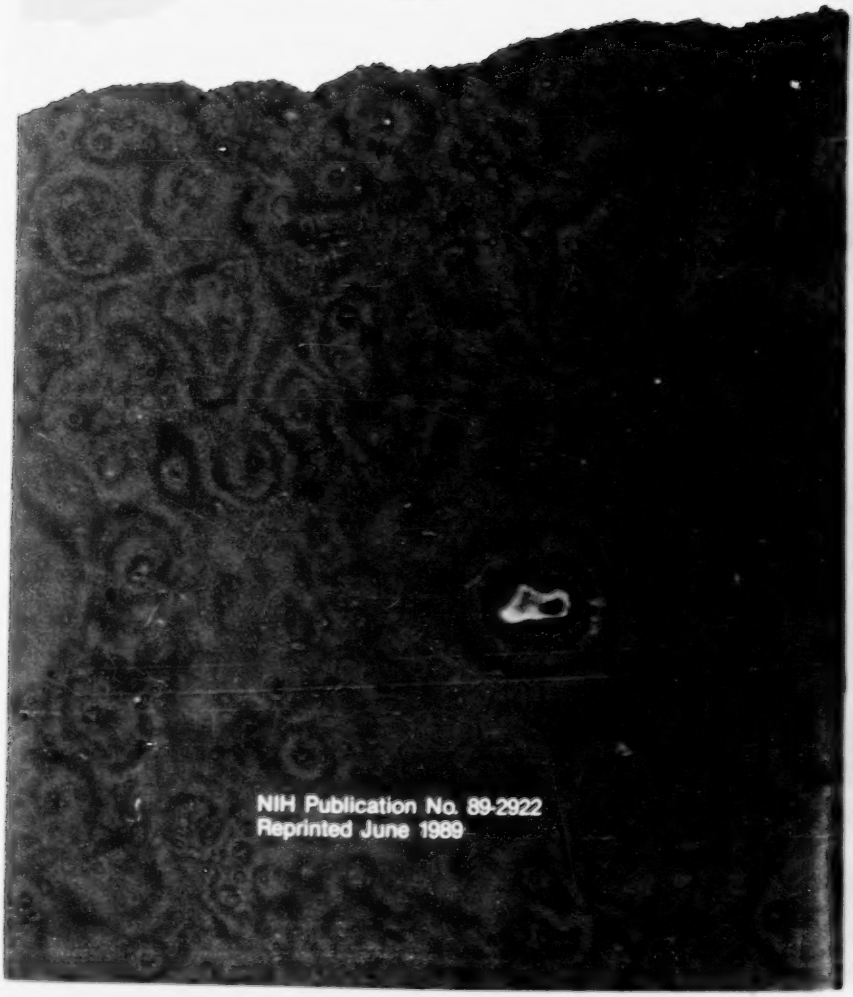

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